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On *Speleosiro argasiformis*—a troglobitic Cyphophthalmi (Arachnida: Opiliones: Pettalidae) from Table Mountain, South Africa

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Abstract. We report the recent collection and observation of large numbers of specimens of the troglobitic harvestman *Speleosiro argasiformis* Lawrence, 1931 in the Wynberg Cave system, Table Mountain. Specimens were collected and / or photographed in different caves of the system. Live observation showed specimens fleeing bat carcasses when disturbed.

Keywords: Wynberg cave, Gondwana

Cyphophthalmi or mite-harvestmen are mostly known from pristine forests in continental landmasses and islands of continental origin, and some species are known to inhabit cavernicolous environments. Cave cyphophthalmids are not uncommon, with several species described from around the globe (e.g., Juberthie 1971; Rambla and Juberthie 1994; Schwendinger et al. 2004). But only a few of these are true troglobites (also called troglomorphs or troglobiomorphs), possessing morphological adaptations such as lighter pigmentation, reduced eyes, and elongated appendages. Of these true troglobites, most species have small distribution areas and often are the only representatives within their respective families that show such adaptations. This results in a long list of described monotypic genera of cyphophthalmid troglobites, including *Tranteeva* Kratochvíl 1958 (Sironidae; now in *Cyphophthalmus* Joseph 1868), *Shearogovea* Giribet 2011, and *Marwe* Shear 1985 (of uncertain affinities), *Canga* DaSilva, Pinto-da-Rocha & Giribet 2010 (Neogoveidae, although this species is probably a troglophile or even a troglaxene), a few stylocellids (e.g., *Fangensis* Rambla 1994), and *Speleosiro* Lawrence 1931 (Pettalidae), the latter being the subject of this note.

The first true troglobiomorphic cyphophthalmid described with elongated appendages and large body size was *Speleosiro argasiformis* Lawrence 1931 from Wynberg Cave in Table Mountain (Western Cape Province, South Africa) (Lawrence 1931). *Speleosiro argasiformis* is the only member of the Gondwanan family Pettalidae that inhabits the dark zone of caves, despite the high diversity of pettalids in New Zealand (Boyer and Giribet 2009; Forster 1948, 1952), Australia (Boyer and Reuter 2012; Giribet 2003; Juberthie 1989), Chile (Shear 1993), and South Africa (de Bivort and Giribet 2010; Hansen and Sørensen 1904; Lawrence 1931, 1933, 1939, 1963). Here we summarize the

knowledge on *S. argasiformis*, accompanied with new data and observations on its abundance and behavior in different caves of the Wynberg cave system.

We have studied all known specimens of *S. argasiformis*, including those deposited in museum collections. We also review all the literature citations known to us. In addition, we provide new observations on collections made by the authors during a visit to the Wynberg cave system in November 5, 2011. Additional photographic material was available from prior visits to the caves by A.H. and P.S. Newly acquired specimens are deposited in the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (USA; MCZ DNA107066-107069). Historical specimens are deposited in the South African Museum, Cape Town, Western Cape Province (South Africa; SAM), or in the Natal Museum, Pietermaritzburg, KwaZulu-Natal (South Africa, NMSA).

Material examined.—*Type material*: SOUTH AFRICA: *Western Cape Province*: holotype female, Wynberg Caves, 1913, K.H. Barnard (SAM B1473).

Other material examined: SOUTH AFRICA: *Western Cape Province*: 1 ♂, 2 juv., Wynberg Caves (NMSA 7660) [the two subadult ♀ reported as additional material in the original description; the male described in p. 503]; 1 ♂, 1 ♀, Bat's Cave, xi.1960, N. Leleup (NMSA); 1 female, Wynberg Caves¹, 30.vii.1988, M. Bing (NMSA 14657); 1 ♀, Bat's Cave, 1956, U. Cape Town Ecol. Surv. (SAM C2022); 1 ♀, Wynberg Caves, under rocks, 25.ix.1960 (SAM C2023); 8 specimens, Wynberg Cave, 5.xi.2011 (MCZ IZ-134759); 1 ♂, Wynberg Cave, 5.xi.2011 (MCZ IZ-134760); 1 ♀, Wynberg Cave,

¹ We differentiate between Wynberg Caves in the old labels, and Wynberg Cave in the new collections, as the caves system has been mapped recently but the older labels referred to as the entire Wynberg Cave system and it is unclear whether "Wynberg Caves" refers to what it is currently recognized as Wynberg Cave or to any of the other connected caves.

5.xi.2011 (MCZ IZ-134761); 2 females, 1 juv., Inukshuk Cave, 5.xi.2011 (MCZ IZ-134762).

Geographic and geologic setting:

All specimens have been collected from three caves in the Wynberg Cave system (referred to as “Wynberg Caves” in the older collections): Wynberg Cave, Bat’s Cave, and Inukshuk Cave. A physical mapping of the system was undertaken by the South African Spelaeological Association (Cape Town), with participation from A.H. and P.S. A detailed profile of the system and the location of specimens are provided in Figure 1.

Specimens of *Speleosiro argasiformis* (Fig. 2) have been observed in three caves: Wynberg, Inukshuk, and Bat’s Cave. This species is especially abundant in Wynberg Cave, where ca. 25 specimens were seen in different galleries in all the main levels of the cave (Fig. 1). The largest concentration of individuals occurred in the dark zone near the entrance, at a site where small stones and bat guano accumulated (right red dot in Fig. 1). The second largest aggregation occurred on a decaying bat’s carcass, covered in guano (Fig. 2D), where we saw three specimens fleeing the carcass after being exposed to light. Another specimen was also observed under a second bat carcass (Fig. 2E). We also noticed several individuals walking about the cave’s floor or lower part of the walls, or under medium-sized stones (stones larger than 5 cm in diameter), always in the dark, humid zone of the cave. Associated troglobitic fauna includes other Opiliones (*Speleomontia cavernicola* Lawrence 1931), and the rare Neopilionidae *Vibone vetusta*

Kauri 1961, several species of spiders, pseudoscorpions, isopods (Crustacea, Malacostraca, Isopoda), an undescribed centipede in the genus *Paralamyctes* (Chilopoda, Lithobiomorpha, Henicopidae), and the troglophile camel cricket *Speleiacris tabulae* (Orthoptera, Rhaphidophoridae). Perhaps the most spectacular is the blind albino velvet worm *Peripatopsis alba* Lawrence 1931. Most of these species are considered to be endangered or critically endangered, as is the case with *P. alba* (Hamer et al. 1997; Sharratt et al. 2000).

Speleosiro argasiformis is poorly known from museum collections and has been considered a “rare species.” Referring to the type specimens of this species, Lawrence (1931:350–351) states:

“These 3 specimens were found in the Wynberg Cave of Table Mountain, one by Dr. K. H. Barnard in 1913², the other two by myself in May 1929³. The cave occurs at the top of the mountain in the Table Mountain sandstone; the entrance to the caves is tortuous and narrow, and the main body of it where the specimens were found is about 100 feet below the surface, the possibility of any light reaching it being thus precluded; the walls of the main cave are damp and slimy from the water which constantly percolates through fissures in the rocks; the specimens were found under small stones on very damp or even wet sand. The only vegetation seems to consist of a small lichen and the fauna is sparse, the chief representative being the peculiar Acridiid Orthopteron, *Speleiacris tabulae* ;

² This is specimen SAM B1473.

³ These are the two subadult females from lot NMSA 7660; the male was later described in p. 503.

another peculiar animal inhabiting the cave is a blind and unpigmented *Peripatus*, *Peripatopsis alba*. Outside at the mouth of the cave were found specimens of *Purcellia illustrans* in the usual habitat.”

Juberthie (1970, 1971) provided further details and an accurate redescription of *S. argasiformis*, expanded by de Bivort & Giribet (2010), but no new material was reported by any of these authors. Sharratt et al. (2000) studied the cave fauna of the Cape Peninsula and reported 14 specimens of *S. argasiformis* (misspelled as *S. argasiformes*). These authors proposed that *S. argasiformis*, along with most of the other endemic carvernicoles, be considered Endangered under IUCN Red List Categories, due to their limited distributions. The estimated abundances for Wynberg and Bats’ Caves were 0.494 ± 0.63 (0.282 for Wynberg and 0.707 for Bats’ Cave).

One of the arguments provided by Sharratt et al. (2000) for the conservation status of *S. argasiformis* is its phylogenetic uniqueness, for being the only member of its genus. Morphological cladistic analyses suggest that *Speleosiro* is related to *Purcellia* (de Bivort et al. 2010; de Bivort and Giribet 2010; Giribet et al. 2012), but do not resolve its exact position with respect to the *Purcellia* species. In fact, Lawrence suggested that *Speleosiro argasiformis* is a troglobitic version of the surface species *Purcellia illustrans*. Preliminary molecular data (results not shown) corroborate the monophyly of *Purcellia* + *Speleosiro* (three species of *Purcellia* and *Speleosiro* are identical for 18S rRNA); however, *Speleosiro* is closer to *P. leleupi* and *P. griswoldi* than to the sympatric species *P. illustrans*, according to cytochrome *c* oxidase subunit I data.

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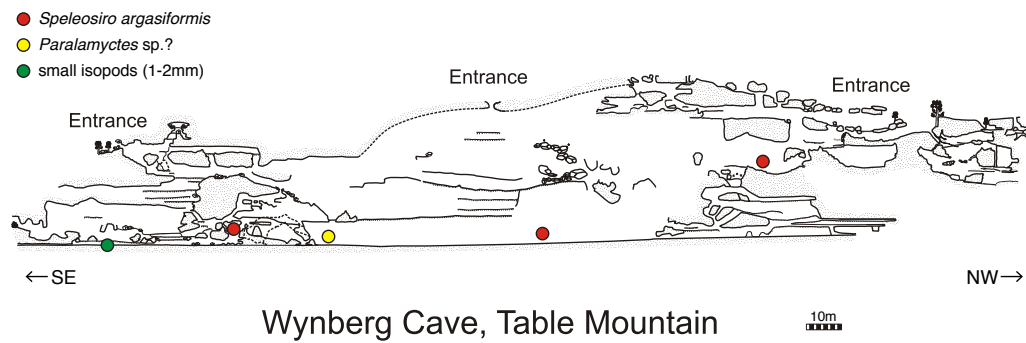


Figure 1.—Profile of the Wynberg Cave system, with localities where *S. argasiformis* was located. Other new arthropod species are indicated.

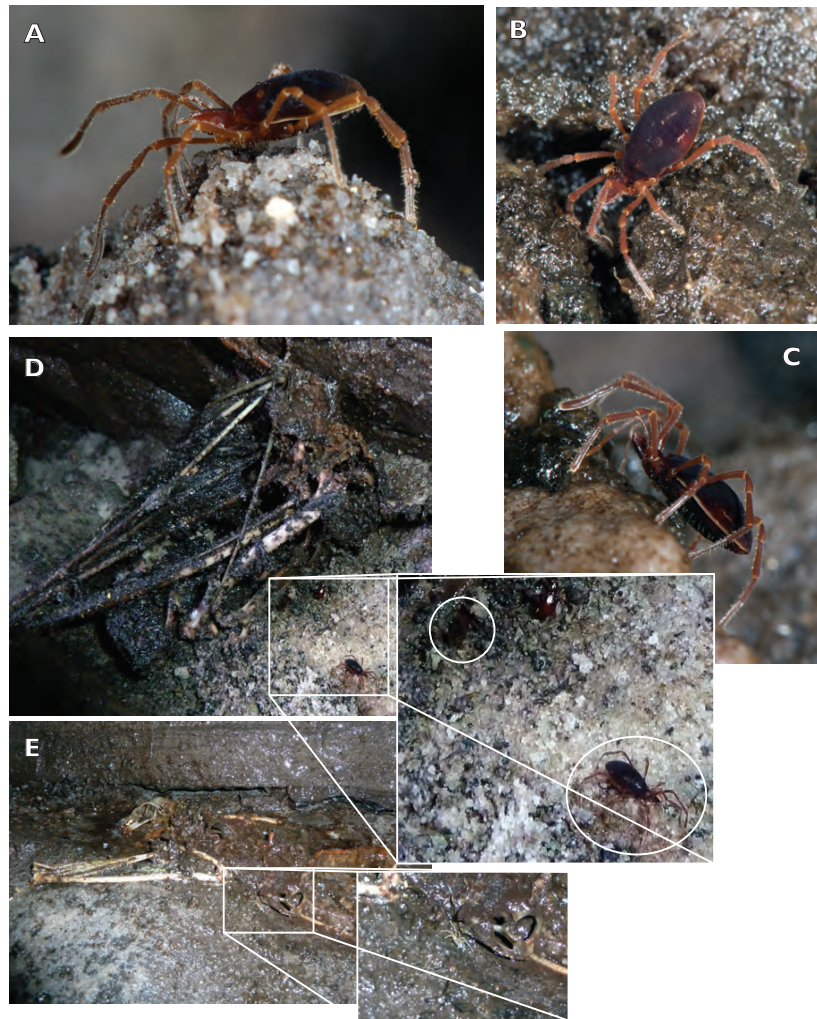


Figure 2.—A. Male adult individual near entrance (right red dot in Fig. 1). B. Adult female near cave entrance. C. Adult female near cave entrance. D. Bat carcass with a fleeing *Speleosiro* specimen and the rear end of another specimen under the carcass visible (see inset). E. A different bat carcass in the bottom of the cave (mid red dot in Fig. 1) with a juvenile specimen fleeing after being disturbed.